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NOTES FROM PACIFIC COAST OBSERVATORIES.

RECENT DOUBLE-STAR LITERATURE.

The most important of the recent publications relating to double-star astronomy is the "Catalogue and Remeasurement of the 648 Double Stars Discovered by Professor G. W. HOUGH," issued as Volume III, Part III, of the Astronomical Series of the Publications of the University of Pennsylvania. The author is Professor ERIC DOOLITTLE, who has in this volume done for the Hough stars what BURNHAM, HUSSEY, and LEWIS had previously done for the Burnham, Otto Struve, and Struve stars, respectively.

Professor DOOLITTLE's plan involved a complete remeasurement of all the stars discovered by HOUGH. This was begun in 1901, and practically completed within the next two years. The Hough stars, however, include a number that are very close pairs, and hence exceedingly difficult to measure with an 18-inch telescope. There are also sixteen pairs that have never been seen double since HOUGH listed them. The stars in these two classes, especially the latter, required careful watching for a number of years before satisfactory measures could be secured or the definite statement made that the star was single at the present time.

The work as it now appears is very satisfactory from every point of view. The measures have been made in the careful and thorough manner that has characterized all of DOOLITTLE's work, and the arrangement of the results is convenient, and enables the reader to gather quickly all extant information regarding any star.

In his Introduction, Professor DOOLITTLE comments on the comparatively few measures that have hitherto been made of the Hough stars. Only twenty-three of them have been measured more than five times, 494 have been measured by HOUGH only, and sixty-six of these on only one night. It was thus

obvious that systematic remeasurement was urgently demanded. As might have been expected, however, the new measures have revealed orbital motion in comparatively few pairs. This is mainly due to the fact that none of HOUGH's discoveries date back thirty years, his first list, containing 209 pairs discovered between 1881 and 1886, having been published in 1887; and some are more recent than 1898. That a large percentage will ultimately show orbital motion cannot be doubted, for nearly four hundred of the Hough pairs have distances under 5", and the probability that such pairs are binary systems is so great as to amount to practical certainty. It will take a long time, however, for the orbital motion to become evident, and careful examination of the volume before us indicates that it will be unnecessary to remeasure the greater number of Hough stars for another quarter of a century. About 100 pairs, on the other hand, ought to be remeasured within the next few years, and fully half that number should be closely watched.

The most interesting star in the catalogue is 13 *Ceti* = Ho 212, on the rapid motion of which the present writer has commented in earlier numbers of these *Publications*.¹ Professor DOOLITTLE has computed the orbit of this pair with results that are in satisfactory agreement with my own, the two revolution periods being 7.42 and 7.35 years.

Among other publications of interest to double-star observers we note the new series of articles on "Double-Star Astronomy" now appearing in *The Observatory*. In 1893 Mr. THOMAS LEWIS, of the Greenwich Observatory, published a series of papers with the same title in the same journal. The present series, which began in the February (1908) number, is a second edition, revised and brought up to date. The general reader as well as the specialist will find much to interest him in these articles.

In the *Astronomische Nachrichten*, No. 4229, Dr. W. A. DOBERCK publishes a paper entitled "On the Accuracy of Measures Made by the Principal Double-Star Observers," in which he gives the results of comparisons of observations with positions computed from the orbits of thirty binaries which he has lately investigated. The paper is a very interesting one, and brings out clearly several important points. The first is that the probable errors of measurement are in general very small,

¹ See Vol. XVII., pp. 26 and 159; Vol. XIX., p. 54.

seldom exceeding $0''.05$ in either angle or distance. In the second place, it is evident that the size of the error is influenced by the relative magnitudes of the two components, and also by their angular separation. The interesting point is developed that the probable error of angle measure, as well as of distance measure, in general *increases* with increasing distance, within the limits investigated.

In another number of the same journal (4235), Dr. DOBERCK continues his study of binary stars with an orbit of γ *Virginis*. It may be added that Dr. DOBERCK has recently established a private observatory near London, in England, and has resumed the active observation of double stars in addition to his mathematical researches.

Rev. T. E. ESPIN continues his work on double stars with unabated enthusiasm, as is evident from his "Fifth Series of Measures of Double Stars" and "A List of 109 New Double Stars," which are published in the *Monthly Notices* R. A. S. for January, 1908. Of the new pairs five are under $2''$ and the majority under $10''$, though a number of wider pairs are included. The desirability of listing the wider pairs as double stars seems questionable to the present writer. The only object it can have is to call attention to these pairs in the hope that they will be measured, and whatever relative motion may exist be thus brought to light. But experience has demonstrated that relative motion is very slow, even in the moderately close pairs—those from $2''$ to $5''$. Would it not be wiser to concentrate the energies of micrometer observers upon these and *closer* pairs, leaving the motion in the wider pairs to be discovered by photographic methods?

The same number of *Monthly Notices* contains orbits of the binaries β 80, β 513, and β 552, by Dr. T. J. J. SEE. These are all of interest, and will serve to call new attention to systems that ought to be measured every year or two. The observations of the next ten or fifteen years should furnish data to improve these first approximations to the elements.

Double-star observations occasionally appear in unexpected places. Thus the "Katalog von 10663 Sternen," just published as No. 10 of the New Bonn Observatory Publications, by Professor F. KÜSTNER, gives, on pp. 79-94, a list of micrometric measures of double stars and companion stars within $1'$

detected during the course of the meridian-circle observations. Only such pairs have been measured as had not been adequately measured elsewhere.

R. G. AITKEN.

May 22, 1908.

PROGRESS ON THE CROSSLEY *EROS* SOLAR PARALLAX WORK.

The work of determining the solar parallax from the photographs of *Eros*, taken with the Crossley reflector in 1900, is almost completed. The plates which were selected for use have all been measured and reduced by Mrs. MOORE (*née* CHASE) and Miss HOBE. For some months now a discussion and comparison of the results has been in progress. This discussion is nearly completed, and it is hoped soon to send the manuscript to the printer.

While the final parallax has not yet been derived, it can be said that it will hardly differ $0''.010$ from $8''.800$.

MT. HAMILTON, May 21, 1908.

C. D. PERRINE.

RECENT OBSERVATIONS OF THE MOVING OBJECT NEAR *JUPITER*, DISCOVERED AT GREENWICH BY MR. J. MELOTTE.

After the receipt of the telegraphic announcement of the discovery of this object, early in March, Dr. ALBRECHT obtained some photographs of the region with the Crossley reflector, on the nights of March 7th, 8th, and 9th. The new object (as well as the sixth and seventh satellites) is shown on the plates of March 8th and 9th. A position obtained on March 8th has been published.

Photographs have been obtained by the writer on March 24th, 27th, 31st, April 1st, 28th, and 29th, on which the Greenwich object, the sixth and seventh satellites are shown. The following positions have been derived from the photographs of April 1st and 29th:—

April, 1908.

α	1908.0	$8^h 26^m 45^s.58$	δ	1908.0	$+19^\circ 49' 27''.4$
α	1908.0	$8^h 33^m 44^s.22$	δ	1908.0	$+19^\circ 35' 49''.0$

In brightness, the new object differs but little from the seventh satellite.

From a preliminary discussion of the observations from January 27th to April 3d, the Greenwich astronomers conclude that it belongs to *Jupiter*.¹

¹ *The Observatory* for May, 1908, and *A. N.*, No. 4246.